TUTORIAL

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Deep Learning

In this tutorial, we will review the basic concepts of Convolutional Neural Networks (CNN), we will define a few neural network models (including CNN), train them and evaluate their performance for image classification and some other related tasks. CNNs have become the state-of-the-art methods for any image-processing task. Their performance on image classification problems (reaching levels beyond human capacities) has motivated their application to many other challenges (image segmentation, image clustering, volumetric space processing, style transfer, synthetic image generation, etc.).

The agenda:
Day 1:
Theory 1.1: Introduction to artificial neurons, activation functions, fully connected networks, back propagation algorithm and other basic components.
Hands on 1.1: Train a network with 2 fully connected layers for solving MNIST
COFFE BREAK
Theory 1.2: Limitations of fully connected layers. Computational cost.
Hands on 1.2: Train a network with 2 fully connected layers for solving CIFAR100

Day 2:
Theory 2.1: Introduction to convolutional layers, pooling and typical archtiectures
Hands on 2.1: Train a network with 1 convolutional, 1 fully connected layer for solving CIFAR100
COFFE BREAK
Theory 2.2: Style transfer
Hands on 2.2: Use a pre-trained network to perform image style transfer

Dr. Darío Garcia-Gasulla is a Post Doc at BSC since 2015. Before that, he worked as an assistant researcher for four years at the KEMLg group (UPC), participating in several research projects related to Artificial Intelligence (particularly in Knowledge Representation and Reasoning, Machine Learning and Data Mining). His PhD thesis tackled the large-scale graph-mining problem, bringing together AI and HPC topics. As a Post Doc, he is now leading a research project for the integration of Deep Learning and graph mining technologies.